

a fundamental principle of molecular fluorescence known as Kasha rule (M. Kasha, “Characterization of electronic transitions in complex molecules”, *Discuss. Faraday Soc.*, 8, 14 (1950)). According to the Kasha rule, a fluorophore in the condensed phase emits a *single-band spectrum* from its lowest singlet excited state (LES), due to the vibrational relaxation and non-radiative dissipation of excitation energy. Natural emission rate for a fluorophore ( $< 10^9 \text{ s}^{-1}$ ) defined by fluorophore transient dipole puts a limit on a rate for fluorophore nonradiative decay of measured fluorescence.

Please amend the CLAIM section as shown on the following pages.

#### CLAIMS.

Claim 1 (currently amended): ~~A method and composition of surface sensor for plasmon-resonance enhanced multiband absorption and multiband fluorescence for optochemical sensing and or molecular identification comprises of:~~

- ~~a) — A molecule, electromagnetic radiation and a metal nanoparticle interacting on each other causing enhanced multiband absorption and multiband emission of the molecule,~~
- ~~b) — An analyte chemically or physically interacting with the molecule in the presence of the metal nanoparticle, wherein said the analyte modifies multiband absorption and multiband emission properties of the molecule,~~
- ~~c) — A spacer to control distance between the molecule and the metal nanoparticle to optimize multiband absorption and multiband emission from the molecule,~~

- ~~d) A sensor for optochemical sensing of analytes by surface plasmon resonance enhanced multiband absorption and multiband emission of the molecule,~~
- ~~e) An electromagnetic radiation source or chemical source for excitation the molecule and the metal nanoparticle.~~
- a) A molecule, a metal nanoparticle and a plasmon energy source, wherein the molecule and the nanoparticle interacting on each other in the presence of energy emitted by the plasmon source causing enhanced multiband absorption or multiband emission of the molecule,
- b) An analyte, wherein the analyte chemically or physically interacts with the molecule and modifies multiband absorption or multiband emission properties of the molecule.

Claim 2 (currently amended): The sensor of claim 1, wherein the molecule or the analyte is an organic molecule, inorganic molecule, biomolecule or microbe.

Claim 3 (cancelled): ~~The method of claim 2, wherein the molecule is fluorophore and is selected from the group consisting of a protein, amino acid, oligonucleotide, lipid, sugar moiety, purine or pyrimidine, nucleoside or nucleotide, genetically engineered biomolecule, fluorescence dye, fluorescence biomarker, metal ligand charge transfer complex, up-converted fluorophore, fluorescence dendrimer, pair of fluorescent donor and fluorescent acceptor, pair of fluorescent donor and quencher or fluorescent metal nanoparticle.~~

Claim 4 (cancelled): ~~A method of claim 1, wherein the analyte is selected from the group~~

~~consisting of glucose, inorganic molecule, protein, amino acid, oligonucleotide, lipid, sugar moiety, purine or pyrimidine, nucleoside or nucleotide.~~

Claim 5 (currently amended): The sensor of claim 1 further comprises of a spacer placed between the molecule and the metal nanoparticle, wherein the spacer is controlling multiband absorption or multiband emission of the molecule. ~~The method of claim 1, wherein the spacer is selected from the group consisting of a biorecognitive spacer, dielectric spacer, chemical link spacer, analyte sensitive spacer, polymer.~~

Claim 6 (currently amended): ~~The method of claim 1~~ The sensor of claim 1, wherein the metal nanoparticle is made of an ~~metal~~, electrically conductive ~~material~~ structure, electrically super conductive ~~material~~ structure or electrically semi conductive ~~material~~ structure.

Claim 7 (cancelled): ~~The method of claim 6, wherein the metal is selected from the group consisting of silver, ruthenium, platinum, rhenium, rhodium, osmium, iridium, copper, palladium and gold.~~

Claim 8 (cancelled): ~~The method of claim 1, wherein the metal nanoparticle is sub-wavelength in size.~~

Claim 9 (cancelled): ~~The method of claim 1, wherein the spacer separates the molecule from the metal nanoparticle by distance longer than 10 nm.~~

Claim 10 (cancelled): ~~The method of claims 1, wherein the sensor comprises of the single metal nanoparticles and electro-magnetic radiation interacting with molecules at the specific location.~~

Claim 11 (cancelled): ~~The method of claim 1, wherein the sensor comprises at least one thin film of nanoparticles coated on an optical material of refractive index values from 1 to 3.5 and electro-magnetic radiation interacting with the molecules and metal nanoparticles.~~

Claim 12 (currently amended): ~~A method of claims 1, for plasmon-enhanced multiband optochemical sensing or molecular identification the molecule of the multiband absorption and multiband fluorescence of the molecule, said the method comprising the steps of: (a) positioning the nanoparticle and the molecule at a distance apart sufficient to manipulate the multiband absorption and or multiband emission fluorescence from of the molecule; (b) exposing the nanoparticle and the molecule to energy of the plasmon source exciting radiation in the single-photon and multi-photons modes of excitation; and (c) analyzing the multiband absorption and or multiband fluorescence emission from of the molecule in the absence or presence of the analyte.~~

Claim 13 (currently amended): ~~The method of claim 1~~ The sensor of claim 1, wherein the sensor is a microarray, bio-chip, flow cell, endoscope, microscopic slide, total internal reflection cell, catheter, optical fiber or waveguide.

Claim 14 (cancelled): ~~The method of claim 1 electromagnetic radiation selected from the group consisting of a laser with single wavelength, laser with plurality wavelengths, laser diode, light emitted diode, lamp, bioluminescence, chemiluminescence, electroluminescence.~~

Claim 15 (cancelled): ~~The method claim 1, and 12, wherein the method of optochemical sensing comprises analyses of a low excited state and higher excited states absorption and fluorescence emission bands of the molecule.~~

Claim 16 (cancelled): ~~The method claim 1, and 12, wherein the method of molecular identification comprises analyses of the low excited state and higher excited states absorption and fluorescence emission bands of the molecule.~~

Claim 17 (currently amended): The method of claim ~~15, and 16~~ 12, wherein optochemical sensing or molecular identification ~~the low excited state and higher excited states absorption and fluorescence bands of the molecule~~ comprises analyses of: absorption spectra, excitation spectra, fluorescence intensity, fluorescence polarization, fluorescence spectra, one-photon or multi-photon hyperspectral imaging, fluorescence lifetime, plasmon-enhanced Raman scattering, one-photon or multi-photon microscopy, one-photon or multi-photon spectroscopy, fluorescence recovery after photobleaching, fluorescence immunoassay or fluorescence resonance energy transfer.

Claim 18 (cancelled): ~~A method of claim 1 for engineering multiband fluorescence lifetime of the molecule by changing the distances of the molecule adjacent to the nanoparticle; and exposing the molecule to an amount of exciting radiation in the single photon and multi-photons modes of excitation.~~

Claim 19 (cancelled): ~~A method of claim 1 for increasing multiband fluorescence resonance energy transfer on a labeled molecule by changing the distances of the molecule adjacent to a metal particle; and exposing the molecule to an amount of exciting radiation in the single-photon and multi-photons modes of excitation.~~

Claim 20 (currently amended): A method of ~~claim 1 and claim 12~~ for optical sensing with